AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A current supply circuit applied with an AC voltage of a predetermined effective value voltage to output a polyphase AC current to a polyphase load of a predetermined rated power, said current supply circuit comprising:

a polyphase inverter circuit including a series connection of two switching elements for each phase, and outputting said AC current of each phase from a node of said series connection, wherein

said switching element is selected to have a second breakdown voltage, said second breakdown voltage being twice a first breakdown voltage required of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage is input to said polyphase inverter circuit, and

said switching element is selected to produce almost the same turn-on losses in a rated current value of said polyphase inverter circuit, said rated current value being obtained by dividing said rated power of said polyphase load by a voltage value being twice said effective value voltage as said turn-on losses, as turn-on losses based on dynamic losses required in regard to said switching element and said switching frequency of said inverter.

2. (Previously Presented) The current supply circuit according to claim 1, wherein said AC voltage of said predetermined effective value voltage is a single phase, and said current supply circuit further comprises a voltage doubler rectifying circuit performing voltage doubler rectification on said AC voltage of said predetermined effective value voltage to output a rectified voltage to said polyphase inverter circuit.

3. (Original) The current supply circuit according to claim 2, wherein

said voltage doubler rectifying circuit and said polyphase inverter circuit are modularized.

4. (Previously Presented) A polyphase drive circuit comprising:

the current supply circuit according to claim 3; and

a polyphase motor for 400 V supplied with current from said polyphase inverter circuit.

5. (Previously Presented) A method of designing a current supply circuit applied with an AC voltage of a predetermined effective value voltage to output a polyphase AC current to a polyphase load of a predetermined rated power,

said current supply circuit comprising a polyphase inverter circuit, said polyphase inverter circuit including series connection of two switching elements for each phase, and outputting said AC current of each phase from a node of said series connection, and

said method comprising the steps of:

(a) setting a current value as a rated current value of said polyphase inverter circuit, said current value being obtained by dividing said rated power of said polyphase load by a voltage value being twice said effective value voltage; and

(b) selecting said switching element having a second breakdown voltage based on said rated current value, said second breakdown voltage being twice a first breakdown voltage

required of said switching element when a DC voltage obtained by performing full-wave rectification on said AC voltage is input to said polyphase inverter circuit.

6. (Previously Presented) The method of designing a current supply circuit according to claim 5, wherein

said AC voltage of said predetermined effective value voltage is a single phase, and

said current supply circuit further comprises a voltage doubler rectifying circuit performing voltage doubler rectification on said AC voltage of said predetermined effective value voltage to output a rectified voltage to said polyphase inverter circuit.

7. (Currently Amended) The method of designing a current supply circuit according to claim 5, wherein in said step (b), as a switching frequency ~~(fsw)~~ of said inverter increases, said switching element is selected in a range with low turn-on losses ~~(Esw(on))~~ in said rated current value.

8. (Currently Amended) The method of designing a current supply circuit according to claim 7, wherein

said step (b) further comprises the steps of:

(b-1) setting turn-on losses ~~(Esw(on) = Esw / 2)~~ based on dynamic losses ~~(Psw)~~ required in regard to said switching element and said switching frequency ~~(fsw)~~ of said inverter; and

(b-2) selecting said switching element having said second breakdown voltage, and producing almost the same turn-on losses as said turn-on losses in said rated current value set in said step (b-1).

9. (Currently Amended) The method of designing a current supply circuit according to claim 6, wherein in said step (b), as a switching frequency ~~(fsw)~~ of said inverter increases, said switching element is selected in a range with low turn-on losses ~~(Esw(on))~~ in said rated current value.

10. (Currently Amended) The method of designing a current supply circuit according to claim 9, wherein

said step (b) further comprises the steps of:

(b-1) setting turn-on losses ~~(Esw(on) = Esw / 2)~~ based on dynamic losses ~~(Psw)~~ required in regard to said switching element and said switching frequency ~~(fsw)~~ of said inverter; and

(b-2) selecting said switching element that has said second breakdown voltage, and produces almost the same turn-on losses as said turn-on losses in said rated current value set in said step (b-1).

11. (Currently Amended) The method of designing a current supply circuit according to claim 5, wherein

said switching element is an IGBT element, and

in said step (b),

an increment ~~(ΔEsw)~~ of turn-on losses in rated current value of said IGBT element having said second breakdown voltage with reference to turn-on losses ~~(EL)~~ in rated current value of said IGBT element having said first breakdown voltage is defined as a divisor,

the product of a first value, a second value, and a third value is defined as a dividend, said first value ~~(VL $-\Delta$Vce)~~ being obtained by subtracting an increment ~~(ΔVce)~~ of a saturation voltage of said IGBT element having said second breakdown voltage with reference to a saturation voltage ~~(VL)~~ of said IGBT element having said first breakdown voltage from said saturation voltage ~~(VL)~~, said second value ~~(Icp)~~ being a maximum value of an output current of said inverter in terms of sinusoidal wave, and said third value being ~~(~~ π/16~~)~~, and

said IGBT element having said second breakdown voltage is selected in an area with a lower switching frequency ~~(fsw)~~ of said inverter than the result obtained by dividing said dividend by said divisor.

12. (Currently Amended) The method of designing a current supply circuit according to 6, wherein

said switching element is an IGBT element, and

in said step (b),

an increment ~~(ΔEsw)~~, multiplied by a factor of ~~(~~2 / π~~)~~, of turn-on losses in rated current value of said IGBT element having said second breakdown voltage with reference to turn-on losses ~~(EL)~~ in rated current value of said IGBT element having said first breakdown voltage is defined as a divisor,

a value is defined as a dividend, said value ~~(Pd + (VL − ΔVce) · Icp / 8)~~ being obtained by adding losses ~~(Pd)~~ for one diode included in said voltage doubler rectifying circuit ~~(22)~~ to the product of a first value, a second value, and a third value, said first value ~~(VL − ΔVce)~~ being obtained by subtracting an increment ~~(ΔVce)~~ of a saturation voltage of said IGBT element having said second breakdown voltage with reference to a saturation voltage ~~(VL)~~ of said IGBT element having said first breakdown voltage from said saturation voltage, said second value ~~(Icp)~~ being a maximum value of an output current of said inverter in terms of sinusoidal wave, and said third value being ~~(~~1 / 8~~)~~, and

said IGBT element having said second breakdown voltage is selected in an area with a lower switching frequency ~~(fsw)~~ of said inverter than the result obtained by dividing said dividend by said divisor.

13. (Currently Amended) The method of designing a current supply circuit according to claim 11, wherein said inverter has said switching frequency ~~(fsw)~~ set to 7 kHz or less.

14. (Original) The method of designing a current supply circuit according to claim 5, wherein said predetermined effective value voltage is 200 V, and said first breakdown voltage is 600 V.

15. (Original) The method of designing a current supply circuit according to any one of claims 5 to 14, wherein said switching element is an IGBT element.